CLAIMS:

1. A method of triggering an imaging system, comprising:
sensing physiological activity;
isolating an event in the physiological activity; and
predicting a future occurrence of the event for triggering an imaging system.

2. The method of claim 1, wherein sensing physiological activity comprises mechanically sensing internal physiological activity.

3. The method of claim 1, wherein sensing physiological activity comprises non-intrusively sensing internal physiological activity.

4. The method of claim 1, wherein sensing physiological activity comprises sensing motion of an internal organ of a subject.

5. The method of claim 1, wherein sensing physiological activity comprises sensing a plurality of physiological parameters.

6. The method of claim 1, wherein sensing physiological activity comprises sensing internal mechanical activity of a subject.

7. The method of claim 6, wherein sensing internal mechanical activity comprises sensing cardiovascular activity of the subject.

8. The method of claim 7, wherein sensing cardiovascular activity comprises sensing cardiac activity.

9. The method of claim 6, wherein sensing internal mechanical activity comprises sensing respiratory activity of the subject.

10. The method of claim 9, wherein sensing respiratory activity comprises sensing lung activity.

11. The method of claim 1, wherein isolating the event comprises analyzing the physiological activity over a time interval.

12. The method of claim 1, wherein isolating the event comprises isolating a desired activity from the physiological activity.

13. The method of claim 12, wherein isolating the event comprises identifying cyclical patterns in the physiological activity.

14. The method of claim 12, wherein isolating the event comprises separating the desired activity based on known motion characteristics of the desired activity.

15. The method of claim 13, wherein isolating the event comprises filtering at least a portion of the cyclical patterns having frequencies outside of an expected frequency range for the desired activity.

16. The method of claim 12, wherein isolating the event comprises identifying a desired phase in a cycle of the desired activity.

17. The method of claim 16, wherein identifying the desired phase comprises identifying a peak amplitude in the cycle.

18. The method of claim 1, wherein isolating the event comprises isolating a repeating point in a cyclical signal corresponding to an internal organ of a subject.

19. The method of claim 18, wherein isolating the event comprises isolating a cardiovascular event of the subject.

20. The method of claim 18, wherein isolating the event comprises isolating a respiratory event of the subject.

21. The method of claim 1, wherein predicting the future occurrence comprises analyzing historical behavior of the physiological activity.

21. The method of claim 1, wherein analyzing historical behavior comprises calculating an expected time interval between successive occurrences of the event.

22. The method of claim 21, wherein predicting the future occurrence comprises determining a reference time based on a previous occurrence of the event and adding the expected time interval to provide a predicted time for the future event.

23. The method of claim 1, wherein predicting the future occurrence comprises adjusting a predicted time to account for system response delays in the imaging system.

24. The method of claim 1, comprising controlling timing of an image acquisition component of the imaging system.

25. The method of claim 1, comprising acquiring a desired image of the event.

26. The method of claim 25, wherein acquiring the desired image of the event comprises obtaining image data of a cardiac phase.

27. The method of claim 1, comprising calculating a prediction error between a predicted time and an actual time of the future occurrence.

28. The method of claim 27, comprising adjusting the predicted time based on the prediction error.

29. The method of claim 27, wherein adjusting the predicted time comprises adjusting a predicted time interval between successive occurrences of the event based on the prediction error.

30. A method of medical diagnosis, comprising:
analyzing internal mechanical activity of a subject;
predicting a cyclical event of the internal mechanical activity; and
facilitating acquisition of physiological data via a diagnostic system at a future time based on the cyclical event predicted.

31. The method of claim 30, wherein analyzing internal mechanical activity comprises sensing physiological activity.

32. The method of claim 31, wherein sensing physiological activity comprises non-intrusively sensing physiological motion.

33. The method of claim 31, wherein sensing physiological activity comprises sensing motion of an internal organ of a subject.

34. The method of claim 31, wherein sensing physiological activity comprises sensing activity of a plurality of physiological features.

35. The method of claim 31, wherein sensing physiological activity comprises sensing cardiovascular activity of the subject.

36. The method of claim 30, wherein analyzing internal mechanical activity comprises isolating a desired activity from the internal mechanical activity.

37. The method of claim 36, wherein isolating the desired activity comprises identifying activity patterns in the internal mechanical activity.

38. The method of claim 37, wherein isolating the desired activity comprises dividing the activity patterns based at least partially on known activity characteristics.

39. The method of claim 36, wherein isolating the desired activity comprises obtaining a cyclical signal having distinguishable characteristics.

40. The method of claim 36, wherein isolating the desired activity comprises identifying a recurring physiological event.

41. The method of claim 30, wherein analyzing internal mechanical activity comprises temporally identifying a relatively motionless phase of a cyclical physiological motion.

42. The method of claim 30, wherein predicting the cyclical event comprises temporally estimating a future occurrence of a physiological event.

43. The method of claim 42, wherein temporally estimating the future occurrence comprises estimating a future cardiovascular event.

44. The method of claim 42, wherein temporally estimating the future occurrence comprises estimating a future respiratory event.

45. The method of claim 30, wherein predicting the cyclical event comprises calculating an expected time interval between successive cycles of the internal mechanical activity.

46. The method of claim 30, wherein facilitating acquisition of physiological data comprises adjusting a time prediction of the cyclical event to account for system response delays.

47. The method of claim 30, comprising providing a triggering signal adapted to trigger a data acquisition unit based at least partially on the cyclical event predicted.

48. The method of claim 30, comprising acquiring physiological data of the internal mechanical activity at the future time.

49. The method of claim 48, wherein acquiring physiological data comprises acquiring data representative of a desired image.

50. The method of claim 49, wherein acquiring data representative of the desired image comprising acquiring data representative of a cardiovascular event.

51. The method of claim 30, comprising acquiring image data of the cyclical event at the future time.

52. The method of claim 30, comprising calculating a prediction error between an actual time and a predicted time of the cyclical event predicted.

53. The method of claim 52, comprising adjusting the predicted time based on the prediction error.

54. A phase-locking system for a physiological diagnostic system, comprising:

a sensor assembly adapted to sense mechanical physiological activity;

a processor assembly coupled to the sensor assembly and adapted to predict physiological activity based at least partially on mechanical physiological activity sensed by the sensor assembly; and

a control assembly coupled to the processor assembly and adapted to generate a control signal for a physiological diagnostic system based on the physiological activity predicted by the processor assembly.

55. The phase-locking system of claim 54, wherein the sensor assembly comprises a non-intrusive sensor.

56. The phase-locking system of claim 54, wherein the sensor assembly comprises a plurality of motion sensors.

57. The phase-locking system of claim 54, wherein the sensor assembly comprises a sensor adapted to sense respiratory activity.

58. The phase-locking system of claim 54, wherein the sensor assembly comprises a sensor adapted to sense cardiovascular activity.

59. The phase-locking system of claim 54, wherein the sensor assembly comprises a sensor adapted to sense a plurality of physiological features of a subject.

60. The phase-locking system of claim 54, wherein the processor assembly comprises a filter for separating at least one signal corresponding to an independent activity of the mechanical physiological activity.

61. The phase-locking system of claim 54, wherein the processor assembly comprises a signal analysis module adapted to evaluate cyclical patterns of the mechanical physiological activity.

62. The phase-locking system of claim 61, wherein the signal analysis module comprises an interval analyzer adapted to estimate a time interval between successive cycles of the mechanical physiological activity.

63. The phase-locking system of claim 54, wherein the processor assembly comprises an event prediction module adapted to calculate a predicted time for a desired phase of the mechanical physiological activity.

64. The phase-locking system of claim 63, wherein the event prediction module comprises a system configuration module adapted to adjust the predicted time based on system response delays.

65. The phase-locking system of claim 63, wherein the event prediction module comprises a prediction correction module adapted to adjust the predicted time based on differences between an actual time and the predicted time for the desired phase.

66. The phase-locking system of claim 54, wherein control assembly comprises a communication system adapted to interface with physiological diagnostic system.

67. The phase-locking system of claim 54, wherein communication system is adapted to interface with a medical imaging system.

68. The phase-locking system of claim 54, comprising a medical diagnostic system coupled to the control assembly and adapted to acquire physiological data.

69. The phase-locking system of claim 68, wherein the medical diagnostic system comprises an imaging unit.

70. The phase-locking system of claim 69, wherein imaging unit comprises a magnetic resonance imaging unit.

71. An imaging system, comprising:

an image acquisition device;

control circuitry coupled to the image acquisition device;

a motion sensor oriented to sense activity affecting a targeted image region of the image acquisition device; and

processor circuitry coupled to the motion sensor and adapted to analyze and predict the activity for acquisition timing of the image acquisition device.

72. The imaging system of claim 71, wherein the image acquisition device comprises a medical imaging assembly.

73. The imaging system of claim 72, wherein the medical imaging assembly comprises a magnetic resonance imaging system.

74. The imaging system of claim 71, wherein the control circuitry comprises an acquisition-timing module.

75. The imaging system of claim 71, wherein the motion sensor comprises a non-intrusive sensor assembly adapted to sense mechanical activity.

76. The imaging system of claim 75, wherein the mechanical activity comprises physiological activity of a subject.

77. The imaging system of claim 76, wherein physiological activity comprises cardiovascular activity.

78. The imaging system of claim 71, wherein the processor circuitry comprises a signal analysis module adapted to estimate time intervals between successive cycles of a cyclic activity.

79. The imaging system of claim 78, wherein the signal analysis module comprises a prediction module adapted to calculate a predicted time for a future occurrence of a desired event of the cyclical activity.

80. The imaging system of claim 71, comprising a communication interface between the processor circuitry and the control circuitry.

81. A timing system for a diagnostic system, comprising:

a processing assembly adapted for signal processing and prediction, the processing assembly comprising:

a port adapted to receive an activity signal from a sensor;

a signal separator adapted to isolate at least one cyclical pattern from the activity signal;

an interval estimator adapted to estimate a time interval between successive cycles of the at least one cyclical pattern; and

an event predictor adapted to predict a desired state of the at least one cyclical pattern for a diagnostic system.

82. The timing system of claim 81, comprising the diagnostic system coupled to the processing assembly.

83. The timing system of claim 81, wherein the diagnostic system comprises a medical diagnostic system.

84. The timing system of claim 81, wherein the diagnostic system comprises a physiological imaging system.

85. The timing system of claim 81, comprising the sensor, wherein the sensor comprises a mechanical activity sensor.

86. The timing system of claim 85, wherein the sensor comprises a physiological activity sensor.

87. The timing system of claim 85, wherein the sensor comprises a cardiac activity sensor.

88. The timing system of claim 81, wherein processing assembly comprises an acquisition-timing trigger adapted to trigger the diagnostic system at a predicted time for the desired state.

89. The timing system of claim 81, wherein the processing assembly comprises a system configuration module adapted to adjust a predicted time for the desired state based on system response delays.

90. The timing system of claim 81, wherein the processing assembly comprises a prediction correction module adapted to adjust a predicted time for the desired state based on differences between an actual time and the predicted time for the desired state.